Air Quality Permitting
Statement of Basis

January 24, 2006

Permit to Construct No. P-050028

Western Farm Service, a Division of Agrium U.S., Inc.
Caldwell Facility
Caldwell, Idaho

Facility ID No. 027-00089

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AIR QUALITY DIVISION

FINAL

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Acronyms, Units, and Chemical Nomenclatures

acfm	actual cubic feet per minute
AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
AP-42	Compilation of Air Pollutant Emissions Factors.
AQCR	Air Quality Control Region
CFR	Code of Federal Regulations
CO	carbon monoxide
DEQ	Department of Environmental Quality
EI	emissions inventory
EPA	U.S. Environmental Protection Agency
HAPs	hazardous air pollutants
IDAPA	a numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
lb/hr	pound per hour
MACT	Maximum Achievable Control Technology
MMBtu	million British thermal units
NAAQS	national ambient air quality standard
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NSPS	New Source Performance Standards
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
PSD	Prevention of Significant Deterioration
PTC	permit to construct
Rules	Rules for the Control of Air Pollution in Idaho
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SM	Synthetic Minor
SO_2	sulfur dioxide
T/yr	tons per year
$\mu g/m^3$	micrograms per cubic meter
VOC	volatile organic compound
WFS	Western Farm Service

1. PURPOSE

The purpose for this memorandum is to satisfy the requirements of IDAPA 58.01.01.200, Rules for the Control of Air Pollution in Idaho, for issuing permits to construct.

2. FACILITY DESCRIPTION

The Western Farm Service (WFS) Caldwell facility is a fertilizer manufacturing and retail facility. 10-34-0 ammonium polyphosphate liquid fertilizer is generated or produced in the facility's Reactor No. 1 (10-34-0 Reactor). In addition to 10-34-0 liquid fertilizer, the facility also produces fertilizer mixtures including high potassium fertilizer (0-0-13), ammonium sulfate/urea solution (21-0-0-7), and liquid urea (21-0-0). Other than 10-34-0 production, the fertilizer mixtures produce no air pollutant emissions according to the information provided by WFS. Bulk pesticides (i.e., Roundup, Prowl, and Gramoxone Max) are shipped to the WFS Caldwell facility and repackaged for retail sales.

3. FACILITY / AREA CLASSIFICATION

This facility is classified as a synthetic minor facility because its potential to emit is limited to less than all Tier I operating permit major facility thresholds. The facility is not subject to federal NSPS or NESHAP requirements. The SIC code defining the facility is 2874. The AIRS facility classification is "SM."

The facility is located within AQCR 64 and UTM zone 11. The facility is located in Canyon County which is designated as unclassifiable for all criteria pollutants (PM_{10}, CO, NO_x, SO_2, lead, and ozone).

The AIRS information provided in Appendix A defines the classification for each regulated air pollutant at WFS Caldwell facility. This required information is entered into the EPA AIRS database.

4. APPLICATION SCOPE

WFS has submitted a PTC application for the 10-34-0 Reactor as required by a Consent Order issued by DEQ in February 2005. The application also includes emissions information for 10 storage tanks that are associated with the reactor, and emissions information for facility's No.2 fuel oil-fired boiler (Boiler No.1), all of which are not regulated as described in Sections 5.4 and 5.5.

4.1 Application Chronology

May 16, 2005	DEQ received the PTC application
June 15, 2005	DEQ declared the application complete
September 6, 2005	DEQ received an addendum, dated September 2, 2005 to the permit application, which described the wet scrubber and demister pads as process equipment

5. PERMIT ANALYSIS

This section of the Statement of Basis describes the regulatory requirements for this PTC action.

5.1 Equipment Listing

Reactor No.1 (10-34-0 Reactor)

The 10-34-0 reactor was custom made by Unocal in the winter of 1985 – 1986. Superphosphoric acid (SPA), ammonia, and water are fed to the reactor at the rates of 1,620, 1,355, and 2,640 gallons per hour, respectively. 10-34-0 ammonium polyphosphate liquid fertilizer is generated at the rate of 4,810 gallons per hour. Emissions from the reactor are exhausted to the atmosphere through two stacks located on top of the reactor vessel above the scrubber (packed bed) and the demister pads. All emissions are controlled.

The reactor has the following stack parameters:

Stack ID	STK01 and STK02
Stack height (ft)	21
Stack exit diameter (ft)	4.0
Stack gas volume (acfm)	19,400
Exit gas temperature (°F)	117

STK01 and STK02 are identical stacks. Exit gas volume and temperature were based on the measurements of the reactor stack at WFS Roberts's facility.

A wet scrubber (a packed bed) and stainless-steel demister pads are integral components of the reactor design. Their primary design function is to optimize the recovery of the liquid fertilizer. As the wet scrubber and the demister pads recover the liquid fertilizer, they also reduce the temperature of the liquid fertilizer and control air pollutant emissions exiting the reactor stacks. A reduction in the post-reaction vapor temperature provides for condensation of liquid fertilizer to optimize fertilizer recovery in the off-gas stream.

Per the applicant, the actual operating schedule is seven hours per day, two days per week, and 12-weeks per year.

Storage tanks

Ten 10-34-0 storage tanks are restocked to capacity during the March to July and October to November production periods and used to supply the demand for sales throughout the remainder of the year.

Boiler No.1

The 3.4 MMBtu/hr No.2 oil-fired boiler was installed in 1966. The emissions from the boiler are uncontrolled.

The boiler has the following stack parameters:

Stack ID	STK03
Stack height (ft)	30
Stack exit diameter (ft)	1.0
Stack gas volume (acfm)	60
Exit gas temperature (°F)	362

The boiler operates on the same schedule as the 10-34-0 reactor, approximately 24 days per year for seven hours each day, but is also used to melt urea. The average boiler operation schedule is estimated to be six hours per day, two days per week, and 52 weeks per year.

5.2 Emissions Inventory

A detailed emissions inventory (EI) was provided in the PTC application. The EI was reviewed by DEQ and some errors were found and corrected. Table 5.2 provides a summary of the EI at the proposed operating schedule – seven hours per day and 72 days per year for the reactor; and six hours per day, two days per week, and 52 weeks per year for the boiler. Per the applicant, currently, the facility is actually operating seven hours per day, 24 days per year for the reactor; and the same schedule as proposed for the boiler. The hourly emissions rates from the reactor were based on the source test data from the Roberts facility. The hourly emissions rates from the No.2 oil-fired boiler were calculated by multiplying emissions factors in AP-42 Section 1.3 (rev. 9/98), by No.2 oil heat content of 140 MMBtu/10^3 gal, and by the boiler's rated capacity of 3.4 MMBtu/hr. The proposed annual emissions rates are calculated by multiplying the hourly rates with 72 days per year. The total annual VOC emissions rate from the tanks was estimated using EPA TANK 4.0 software. The total annual fluorides emissions rate from the tanks was calculated by multiplying the tanks' total VOC emissions rate by fluorides mass fraction of 2.70 x 10^{-3} gram fluorides/gram 10-34-0 product. The hourly VOC and fluoride emissions rates from the tanks were calculated by dividing annual rates by 8,760 hours per year.

Table 5.2 EMISSIONS ESTIMATES AT PROPOSED SCHEDULE

Emissions Unit	PM_{10}		Fluorides		SO_2		VOC		NO_x		CO	
	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr
10-34-0 Reactor, Total, from two identical stacks	3.10	0.78	1.60	0.40	---	---	---	---	---	---	---	---
No.2 Oil Boiler	0.03	0.01	---	---	1.72	0.54	4.86E-03	1.52E-03	0.49	0.15	0.12	0.04
Ten Storage tanks	---	---	6.6E-05	2.9E-04	---	---	0.02	0.11	---	---	---	---
Total		0.79		0.40		0.54		0.11		0.15		0.040

5.3 Modeling

The facility has demonstrated that it would not cause or significantly contribute to a violation of any ambient air quality standard using a flowrate of 17,773 acfm for stacks STK01 and STK02. However, the applicant has revised the flow rate of stack STK01 and STK02 to 19,200 acfm. No sensitivity analysis was performed because the higher flowrate would result in lower ambient concentrations. The detailed modeling analysis is included in Appendix B. A summary of the modeling analysis is presented in Table 5.3.

Table 5.3 FULL IMPACT ANALYSIS RESULTS FOR PM_{10}[a]

Pollutant	Averaging Period	Ambient Impact from the Reactor Stacks ($\mu g/m^3$)	Background concentration ($\mu g/m^3$)	Total Ambient Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Percent of NAAQS[a]
PM_{10}	24-hour	57.6	73	130.6	150	87%
	Annual	20.1	26	46.1	50	92%

[a] 24 hours per day and 273 days per year.

5.4 *Regulatory Review*

This section describes the regulatory analysis of the applicable air quality rules with respect to this PTC.

IDAPA 58.01.01.201 ..... Permit to Construct Required

Reactor No.1 was installed in the winter of 1985 - 1986 without obtaining a PTC. It requires a PTC. The boiler is not subject to a PTC because it was installed in 1966 and no modification has been made since then.

IDAPA 58.01.01.203.02 ..... NAAQS

"*No permit to construct shall be granted for a new or modified stationary source unless the applicant shows to the satisfaction of the Department all of the following:....02. NAAQS....*"

The facility has demonstrated compliance, to DEQ's satisfaction, that this project will not cause or significantly contribute to a violation of any ambient air quality standards of PM_{10} and SO_2. The emissions of CO, and NO_2 are below the modeling thresholds for criteria pollutants set in *State of Idaho Air Quality Modeling Guideline*. Therefore, no modeling analysis is required for these pollutants. The summary of the modeling analysis is in Table 5.3. Detailed modeling analysis is included in Appendix B.

IDAPA 58.01.01.203.03 ..... Toxic Air Pollutants

"*No permit to construct shall be granted for a new or modified stationary source unless the applicant shows to the satisfaction of the Department all of the following:....03. Toxic Air Pollutants Using the methods provided in Section 210, the emissions of toxic air pollutants from the stationary source or modification would not injure or unreasonably affect human or animal life or vegetation as required by Section 161. Compliance with all applicable toxic air pollutant carcinogenic increments and toxic air pollutant non-carcinogenic increments will also demonstrate preconstruction compliance with Section 161 with regards to the pollutants listed in Sections 585 and 586.*"

The emissions units were installed prior to 1995. The toxic rules do not apply to these emissions units.

IDAPA 58.01.01.625 ..... Visible Emissions

This regulation states that any point of emission shall not have a discharge of any air pollutant for a period aggregating more than three minutes in any 60-minute period of greater than 20% opacity.

The emissions points at this facility are subject to this regulation.

IDAPA 58.01.01 675 ..... Fuel Burning Equipment

This regulation establishes particulate matter emission standards (grain loading standards) for fuel burning equipment. Fuel burning equipment is defined in IDAPA 58.01.01.006.41 as, "Any furnace, boiler, apparatus, stack and all appurtenances thereto, used in the process of burning fuel for the primary purpose of producing heat or power by indirect heat transfer."

This regulation is applicable to the No.2 oil-fired boiler. The permittee shall not discharge PM to the atmosphere from any fuel-burning equipment in excess of 0.050 gr/dscf of effluent gas corrected to 3% oxygen by volume for liquid. The calculated results in the following demonstrate that the boiler is in compliance with the grain loading standard.

Standard exhaust flow was calculated using EPA Method 19 at 3% oxygen and the Fd factor of 9,190 dscf/MMBtu.

$$Vs\ (dscf/hr) = Fd\frac{dscf}{MMBtu}\left(\frac{20.9}{20.9-\%O_2}\right)\times 3.4MMBtu/hr$$
$$= \frac{9{,}190dscf}{MMBtu}\times\left(\frac{20.9}{20.9-3}\right)\times 3.4MMBtu/hr$$
$$= 36{,}483\ dscf/hr$$

$$E_{PM}\ (gr/hr) = E_{PM,method\ 5}\ (lb/hr)\times 7{,}000\ (gr/lb)$$
$$= 0.05\ (lb/hr)\times 7{,}000\ (gr/lb)$$
$$= 350\ (gr/hr)$$

$$PM\ emissons = \frac{E_{PM,method\ 5}(gr/hr)}{Vs(dscf/hr)} = \frac{350(gr/hr)}{36{,}483(dscf/hr)} = 0.01\ (gr/dscf) < 0.05(gr/dscf)$$

Where,

Vs: boiler stack exit gas flowrate at dry standard condition.

$E_{PM,\ method\ 5}$: emissions rate from AP-42 Section 1.3 (rev. 9/98).

IDAPA 58.01.01.701 ..... Process Weight Limitation

The process weight limitation is 16.9 pounds per hour of PM. The reactor's PM emissions rate based on source test data from the similar reactor is 4.8 pound per hour. Therefore, the reactor is in compliance with the process weight limitation

40 CFR 60 ..... New Source Performance Standards

The storage tanks in the facility are not subject to NSPS (i.e. 40 CFR 60 Subparts K, Ka, and Kb) because the tanks don't contain petroleum liquids and the vapor pressure of each tank is less than the threshold in the NSPS.

40 CFR 61 and 63..... National Emission Standards for Hazardous Air Pollutants & MACT

This facility is not subject to 40 CFR 63 Subpart BB because it is not a major source as defined in 40 CFR 63.2.

5.5 Permit Conditions Review

5.5.1 Permit Condition 2.3 establishes the reactor's potential to emit PM_{10}. It is based on the operating schedule requested by the application - seven hours per day and 72 days per year or 504 hours per year. The processing fee of this PTC was calculated based on this permit limit.

5.5.2 Permit Condition 2.4 limits the opacity from the reactor's stack to no more than 20% for a period or periods aggregating three minutes in any 60-minute period.

5.5.3 Permit Condition 2.5 limits the hours the reactor operates to 504 hours per any consecutive 12-month period. This is the operating limit requested by the applicant.

5.5.4 Permit Condition 2.6 requires that the facility develop an O&M manual for the reactor within 60 days of issuance of the permit.

5.5.5 Permit Condition 2.7 requires that the permittee operate the reactor according to the O&M manual.

5.5.6 Permit Condition 2.8 requires the permittee to monitor and record monthly and annually the number of hours the reactor operates to demonstrate compliance with the annual operating hours limit.

6. PERMIT FEES

WFS, Caldwell facility submitted a $1,000 PTC application fee on May 16, 2005, in accordance with IDAPA 58.01.01.224. The Caldwell facility's emissions increase is between one to ten tons range. In accordance with IDAPA 58.01.01.225, the PTC processing fee is $2,500. DEQ received the $2,500 processing fee May 16, 2005.

Table 5.1 PTC PROCESSING FEE TABLE

Emissions Inventory			
Pollutant	**Annual Emissions Increase (T/yr)**	**Annual Emissions Reduction (T/yr)**	**Annual Emissions Change (T/yr)**
NO_X	0.15	0	0.15
SO_2	0.54	0	0.54
CO	0.04	0	0.04
PM_{10}	0.79	0	0.79
VOC	0.00	0	0.00
TAPS/HAPS	0.40	0	0.40
Total:	2.03	0	**2.03**
Fee Due	**$ 2,500.00**		

7. PERMIT REVIEW

7.1 Regional Review of Draft Permit

The draft permit was sent to Boise Regional Office review on August 31, 2005. No comments were received.

7.2 Facility Review of Draft Permit

The draft permit was sent for facility review on November 17, 2005. The comments were addressed.

7.3 Public Comment

An opportunity for public comment period on the PTC application was provided in accordance with IDAPA 58.01.01.209.01.c. During this time, there were no comments on the application and no requests for a public comment period on DEQ's proposed action.

8. RECOMMENDATION

Based on review of the application materials, and all applicable state and federal rules and regulations, staff recommend that the Western Farm Service Caldwell facility be issued a final PTC No. P-050028. No public comment period is recommended, no entity has requested a comment period, and the project does not involve PSD requirements.

Appendix A

AIRS Information

P-050028

AIRS/AFS[a] FACILITY-WIDE CLASSIFICATION[b] DATA ENTRY FORM

Facility Name: Western Farm Service, a Division of Agrium U.S., Inc. Caldwell Facility
Facility Location: Caldwell, ID
AIRS Number: Facility ID No. 027-00089

AIR PROGRAM POLLUTANT	SIP	PSD	NSPS (Part 60)	NESHAP (Part 61)	MACT (Part 63)	SM80	TITLE V	AREA CLASSIFICATION A-Attainment U-Unclassified N- Nonattainment
SO_2	B						B	U
NO_x	B						B	U
CO	B						B	U
PM_{10}	B						B	U
PT (Particulate)	B						B	
VOC	B						B	U
THAP (Total HAPs, HF)							SM	
			APPLICABLE SUBPART					

[a] Aerometric Information Retrieval System (AIRS) Facility Subsystem (AFS)

[b] AIRS/AFS Classification Codes:

A = Actual or potential emissions of a pollutant are above the applicable major source threshold. For HAPs only, class "A" is applied to each pollutant which is at or above the 10 T/yr threshold, or each pollutant that is below the 10 T/yr threshold, but contributes to a plant total in excess of 25 T/yr of all HAPs.

SM = Potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable regulations or limitations.

B = Actual and potential emissions below all applicable major source thresholds.

C = Class is unknown.

ND = Major source thresholds are not defined (e.g., radionuclides).

HF = hydrogen fluoride (hydrofluoric acid).

Appendix B

Modeling Review

P-050028

MEMORANDUM

DATE: October 5, 2005

TO: Shawnee Chen, Permit Writer, Air Program

FROM: Kevin Schilling, Stationary Source Modeling Coordinator, Air Program

PROJECT NUMBER: P-050028

SUBJECT: Modeling Review for the Western Farm Services Permit to Construct Application for their facility in Caldwell, Idaho.

1.0 SUMMARY

Western Farm Service (WFS) submitted a Permit to Construct (PTC) application for previously unpermitted sources at their farm chemical retail and manufacturing facility located near Caldwell, Idaho. Air quality analyses involving atmospheric dispersion modeling of emissions associated with the facility were submitted in support of a permit application to demonstrate that the facility would not cause or significantly contribute to a violation of any ambient air quality standard (IDAPA 58.01.01.203.02).

A technical review of the submitted air quality analyses was conduced by DEQ. The submitted modeling analyses in combination with DEQ's staff analyses: 1) utilized appropriate methods and models; 2) was conducted using reasonably accurate or conservative model parameters and input data; 3) adhered to established DEQ guidelines for new source review dispersion modeling; 4) showed that predicted pollutant concentrations from emissions associated with the facility, when appropriately combined with background concentrations, were below applicable air quality standards at all receptor locations. Table 1 presents key assumptions and results that should be considered in the development of the permit.

Table 1. KEY ASSUMPTIONS USED IN MODELING ANALYSES

Criteria/Assumption/Result	Explanation/Consideration
Emissions from the reactor were estimated by WFS to occur only for a seven-hour period between 9 am and 4 pm for calculating 24-hour averaged impacts.	Although analyses submitted by the applicant only modeled emissions during the eight-hour period, DEQ analyses showed that compliance could be demonstrated for emissions occurring 24 hours per day.
Compliance with the annual PM_{10} standard can be demonstrated for continual operations (8,760 hr/yr).	WFS proposed an annual limit of 72 days/year. DEQ modeling showed continual operation (24 hr/day) for 365 days would still assure compliance with the annual PM_{10} NAAQS.

2.0 BACKGROUND INFORMATION

2.1 Applicable Air Quality Impact Limits and Modeling Requirements

This section identifies applicable ambient air quality limits and analyses used to demonstrate compliance.

2.1.1 Area Classification

The WFS facility is located in Canyon County, designated as an attainment or unclassifiable area for sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), lead (Pb), ozone (O_3), and particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM_{10}). There are no Class I areas within 10 kilometers of the facility.

2.1.2 Significant and Full Impact Analyses

If estimated maximum pollutant impacts to ambient air from the emissions sources at the facility exceed the significant contribution levels (SCLs) of IDAPA 58.01.01.006.91, then a full impact analysis is necessary to demonstrate compliance with IDAPA 58.01.01.203.02. A full impact analysis for attainment area pollutants involves adding ambient impacts from facility-wide emissions to DEQ-approved background concentration values that are appropriate for the criteria pollutant/averaging-time at the facility location and the area of significant impact. The resulting maximum pollutant concentrations in ambient air are then compared to the National Ambient Air Quality Standards (NAAQS) listed in Table 2. Table 2 also lists SCLs and specifies the modeled value that must be used for comparison to the NAAQS.

2.2 Background Concentrations

Background concentrations were revised for all areas of Idaho by DEQ in March 2003[1]. Background concentrations in areas where no monitoring data are available were based on monitoring data from areas with similar population density, meteorology, and emissions sources. Background concentrations used in these analyses are listed in Table 3. Rural/agricultural default values were used for background concentrations. PM_{10} and sulfur dioxide (SO_2) were the only pollutants included in the modeling analyses, since emissions of other criteria pollutants were below modeling applicability thresholds used by DEQ.

Table 2. APPLICABLE REGULATORY LIMITS

Pollutant	Averaging Period	Significant Contribution Levels[a] (µg/m³)[b]	Regulatory Limit[c] (µg/m³)	Modeled Value Used[d]
PM_{10}[e]	Annual	1.0	50[f]	Maximum 1st highest[g]
	24-hour	5.0	150[h]	Maximum 6th highest[i]
Carbon monoxide (CO)	8-hour	500	10,000[j]	Maximum 2nd highest[g]
	1-hour	2,000	40,000[j]	Maximum 2nd highest[g]
Sulfur Dioxide (SO_2)	Annual	1.0	80[f]	Maximum 1st highest[g]
	24-hour	5	365[j]	Maximum 2nd highest[g]
	3-hour	25	1,300[j]	Maximum 2nd highest[g]
Nitrogen Dioxide (NO_2)	Annual	1.0	100[f]	Maximum 1st highest[g]
Lead (Pb)	Quarterly	NA	1.5[h]	Maximum 1st highest[g]

a. IDAPA 58.01.01.006.91
b. Micrograms per cubic meter
c. IDAPA 58.01.01.577 for criteria pollutants
d. The maximum 1st highest modeled value is always used for significant impact analysis
e. Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers
f. Never expected to be exceeded in any calendar year
g. Concentration at any modeled receptor
h. Never expected to be exceeded more than once in any calendar year
i. Concentration at any modeled receptor when using five years of meteorological data
j. Not to be exceeded more than once per year

1 Hardy, Rick and Schilling, Kevin. *Background Concentrations for Use in New Source Review Dispersion Modeling.* Memorandum to Mary Anderson, March 14, 2003.

Table 3. BACKGROUND CONCENTRATIONS		
Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)*
PM_{10}	24-hour	73
	annual	26
SO_2	3-hour	34
	24-hour	26
	annual	8

* Micrograms per cubic meter

3.0 MODELING IMPACT ASSESSMENT

3.1 Modeling Methodology

Table 4 provides a summary of the modeling parameters used in the DEQ verification analyses.

Table 4. MODELING PARAMETERS		
Parameter	Description/Values	Documentation/Additional Description
Model	ISC-PRIME	ISC-PRIME version 04269.
Meteorological data	1987-1991	Boise surface and upper air data
Terrain	Not considered	Area is effectively flat for dispersion modeling purposes.
Building downwash	PRIME algorithm	Building dimensions obtained from modeling files submitted
Receptor grid	Grid 1	25-meter spacing along boundary out to 100 meters
	Grid 2	50-meter spacing out to 500 meters
	Grid 3	100-meter spacing out to 2000 meters

3.1.1 Modeling Protocol

A protocol was not submitted to DEQ prior to submission of the application. With the exception of several methods discussed later in this report, modeling was conducted using methods and data presented in the *State of Idaho Air Quality Modeling Guideline*.

3.1.2 Model Selection

ISCST3 was used by WFS to conduct the ambient air analyses. ISCST3 is not the recommended model in this instance because numerous ambient air receptor locations exist within building recirculation cavities. ISCST3 does not calculate concentrations within recirculation cavities. DEQ verification analyses were conducted using ISC-PRIME. ISC-PRIME incorporates the PRIME downwash algorithm, which is also used in AERMOD, the proposed replacement model for ISCST3. The PRIME algorithm is superior to the existing downwash algorithms within ISCST3 and is capable of estimating concentrations within building recirculation cavities.

3.1.3 Meteorological Data

Site-specific meteorological data are not available for the WFS site in Caldwell. Boise airport is the closest area where model-ready surface meteorological data are available. These data were used in the modeling analyses.

PCRAMMET, the meteorological data preprocessor for ISCST-3, occasionally generates unrealistically low mixing heights as a result of interpolation algorithms used with the twice daily measured mixing heights. DEQ verification modeling was conducted using meteorological data corrected for low mixing heights. All mixing height values below 50 meters were replaced with a value of 50 meters.

3.1.4 Terrain Effects

The modeling analyses submitted by WFS did not considered elevated terrain. Review of a topographic map indicates the area is effectively flat for dispersion modeling purposes, especially considering that maximum impacts are located very near the emission source.

3.1.5 Facility Layout

DEQ verified proper identification of the facility boundary and buildings on the site by comparing the modeling input to a facility plot plan submitted with the application and aerial photographs of the area.

3.1.6 Building Downwash

Plume downwash effects caused by structures present at the facility were accounted for in the modeling analyses. The Building Profile Input Program for the PRIME downwash algorithm (BPIP-PRIME) was used to calculate direction-specific building dimensions and Good Engineering Practice (GEP) stack height information from building dimensions/configurations and emissions release parameters for ISC-PRIME.

3.1.7 Ambient Air Boundary

WFS indicated access is not restricted by a fence; however, public access is restricted through a security plan implemented by facility personnel. The northern portion of the site is leased to the J.R. Simplot Company, and this area was considered to be ambient air.

3.1.8 Receptor Network

The receptor grids used by WFS met the minimum recommendations specified in the *State of Idaho Air Quality Modeling Guideline*. However, because of the close proximity of the emission source to ambient air receptors, DEQ was not satisfied the receptor spacing used was sufficient to reasonably resolve maximum modeled concentrations. DEQ verification analyses were conducted using a more dense receptor grid with 25-meter spacing out to 100 meters.

3.2 Emission Rates

Emissions rates used in the dispersion modeling analyses submitted by the applicant were reviewed against those in the permit application, the engineering technical memorandum, and the proposed permit. The following approach was used for DEQ verification modeling:

- All modeled emissions rates were equal to or greater than the facility's emissions calculated in the PTC application or the permitted allowable rate.
- More extensive review of modeling parameters selected was conducted when model results for specific sources approached applicable thresholds.

Table 5 lists emissions rates for sources included in the dispersion modeling analyses. WFS modeled emissions from the reactor for seven hours per day, between the hours of 9:00 am and 4:00 pm. DEQ verification analyses were conducted assuming continual emissions at the allowable rate. Also, PM_{10} emissions from the boiler were not included in the analyses submitted by WFS. DEQ was not satisfied with the claim that these emissions would have a negligible impact on ambient air receptors and included this source in the verification analyses.

Table 5. MODELED EMISSIONS RATES			
Source Id	Description	Emission Rates (lb/hr)	
		PM_{10}[a]	SO_2[b]
STK01	Reactor stack 1	1.55[c]	0.0
STK02	Reactor stack 2	1.55[c]	0.0
STK03	Boiler stack	0.024[d]	0.85

a. Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers
b. Sulfur dioxide
c. Modeled by WFS at 8 hr/day from 9:00 am – 4:00 pm for short term, annual rates were adjusted by a factor of 0.197 (72/365)
d. Not included in the modeling analyses submitted by WFS

3.3 Emission Release Parameters

Table 6 provides emissions release parameters, including stack height, stack diameter, exhaust temperature, and exhaust velocity. Values used in the analyses appeared reasonable and within expected ranges. Additional documentation /verification of these parameters were not required.

Table 6. EMISSIONS AND STACK PARAMETERS					
Release Point /Location	Source Type	Stack Height (m)[a]	Modeled Diameter (m)	Stack Gas Temp. (K)[b]	Stack Gas Flow Velocity (m/sec)[c]
STK01	Point	6.4	1.2	320	7.4
STK02	Point	6.4	1.2	320	7.4
STK03	Point	9.14	0.3	456	0.4

a. Meters
b. Kelvin
c. Meters per second

3.4 Results for Full Impact Analyses

Impacts of facility-wide emissions were well over the SCLs, thereby requiring full impact analyses for PM_{10}. Results of the WFS-submitted full impact analyses and DEQ's verification analyses are shown in Table 7. As shown, DEQ's 24-hour verification analyses indicated lower impacts than the WFS analyses. This is likely a result of using the PRIME downwash algorithm, shown to more accurately assess impacts from plume downwash caused by the presence of structures. DEQ annual verification analyses showed much higher results than those submitted by WFS. This is primarily because DEQ analyses assumed 365 days per year operation and the WFS analyses assumed a less conservative operational schedule of 72 days per year and seven hours per day.

Table 7. RESULTS OF FULL IMPACT ANALYSES						
Pollutant	Averaging Period	Maximum Modeled Concentration ($\mu g/m^3$)[a]	Background Concentration ($\mu g/m^3$)	Total Ambient Impact ($\mu g/m^3$)	NAAQS[b] ($\mu g/m^3$)	Percent of NAAQS
PM_{10}[c]	24-hour	57.6	73	130.6	150	87
	Annual	20.1	26	46.1	50	92
SO_2[d]	3-hour	268.3	34	302	1,300	23
	24-hour	184.3	26	210.3	365	58
	Annual	58.7	8	66.7	80	83

a. Micrograms per cubic meter
b. National ambient air quality standards
c. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
d. Sulfur dioxide

4.0 CONCLUSIONS

The ambient air impact analysis submitted, in combination with DEQ's verification analyses, demonstrated to DEQ's satisfaction that emissions from the facility, as represented by the applicant in the permit application, will not cause or significantly contribute to a violation of any air quality standard.